NextGen Houston - George Bush Intercontinental Airport

George Bush Intercontinental Airport (IAH) is the 11th busiest airport in North America in terms of passenger traffic, increasing 3.6 percent to 41.3 million in 2014. The number of operations increased by 0.6 percent in 2014, to 499,802. In 2014, IAH was the 14th busiest airport in terms of cargo volume, with 461,492 metric tons of freight and mail passing through its facilities, an increase of 8.1 percent from the previous year. IAH is a large hub for United Airlines. It is served by 21 scheduled passenger airlines. Numerous passenger charter airlines also operate through the airport.

All airport information shown above is reported by Calendar Year (CY).

NextGen Capabilities

Area Navigation (RNAV) Global Positioning System (GPS) Approaches
7/2007
Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
5/2009
Airport Surface Detection Equipment — Model X (ASDE-X)
11/2009
Area Navigation (RNAV) Standard Instrument Departures (SIDs)
7/2010
Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
7/2010
Area Navigation (RNAV) Standard Instrument Departures (SIDs)
9/2010
External Surface Data Release
FY 2011
Area Navigation (RNAV) Global Positioning System (GPS) Approaches
2/2012
Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima
2/2012
Area Navigation (RNAV) Global Positioning System (GPS) Approaches
5/2012
Required Navigation Performance (RNP) Authorization Required (AR) Approaches
5/2012
Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima
5/2012
Ground Based Augmentation System (GBAS) Category I Non-Federal System Approval
5/2013
Wake Turbulence Mitigation for Departures (WTMD): Wind-Based Wake Procedures
7/2013

Deployment of Time Based Flow Management (TBFM)
by 8/2013
Addition of Adjacent Center Metering (ACM) from Memphis Air Route Traffic Control Center (ZME)
3/2014
Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima
5/2014
Houston Metroplex*
5/2014
Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
1/2015
Area Navigation (RNAV) Standard Instrument Departures (SIDs)
4/2015
Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
4/2015
Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
6/2015
Optimized Profile Descents (OPDs)
6/2015
Houston Advanced Air Traffic System (HAATS) Airspace Redesign
5/2012
Situational Awareness and Alerting of Ground Vehicles
3/2016
Wake Re-Categorization Phase 1 — Aircraft Re-Categorization
12/2014

* The Houston Metroplex Project included (not shown in timeline above):

- Area Navigation (RNAV) Standard Instrument Departures (SIDs)
- Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)
- Optimized Profile Descents (OPDs)
- Required Navigation Performance (RNP) Authorization Required (AR) Approaches

- Featured capabilities have extended descriptions.

This timeline reflects programmatic milestones and excludes capabilities implemented across the National Airspace System.

Information as of September 15, 2016.

Area Navigation (RNAV) Global Positioning System (GPS) Approaches

Read how RNAV GPS Approaches and other NextGen technology are used at other locations in the National Airspace System.

Area Navigation (RNAV) Standard Terminal Arrival

Routes (STARs)

Read about Performance Based Navigation and RNAV in the 2017 NextGen Update.

Airport Surface Detection Equipment — Model X (ASDE-X)

Learn more about ASDE-X in the Automatic Dependent Surveillance-Broadcast section of the 2017 NextGen Update.

Read how ASDE-X is used at other locations in the National Airspace System.

Area Navigation (RNAV) Standard Instrument Departures (SIDs)

View a training video for using the RNAV SID phraseology.

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

Read about Performance Based Navigation and RNAV in the 2017 NextGen Update.

Area Navigation (RNAV) Standard Instrument Departures (SIDs)

View a training video for using the RNAV SID phraseology.

External Surface Data Release

Read how surface data sharing is used at other locations in the National Airspace System.

Area Navigation (RNAV) Global Positioning System (GPS) Approaches

Read how RNAV GPS Approaches and other NextGen technology are used at other locations in the National Airspace System.

Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima

Read how expanded low visibility operations have impacted the National Airspace System.

Area Navigation (RNAV) Global Positioning System (GPS) Approaches

Read how RNAV GPS Approaches and other NextGen technology are used at other locations in the National Airspace System.

Required Navigation Performance (RNP) Authorization Required (AR) Approaches

Read how RNP AR Approaches are used at other locations in the National Airspace System.

Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima

Read how expanded low visibility operations have impacted the National Airspace System.

Ground Based Augmentation System (GBAS) Category I Non-Federal System Approval

Read more about Ground Based Augmentation System (GBAS) in the National Airspace System.

Wake Turbulence Mitigation for Departures (WTMD): Wind-Based Wake Procedures

See page two of the NextGen Priorities Joint Implementation Plan- Revision I for additional information about Wake Turbulence Mitigation for Departures (WTMD) in the National Airspace System.

Deployment of Time Based Flow Management (TBFM)

Read how Time Based Flow Management (TBFM) is used at other locations in the National Airspace System.

Addition of Adjacent Center Metering (ACM) from Memphis Air Route Traffic Control Center (ZME)

Read how ACM is used at other locations in the National Airspace System.

Expanded Low-Visibility Operations Using Lower Runway Visual Range (RVR) Minima

Read how expanded low visibility operations have impacted the National Airspace System.

Houston Metroplex *

What is a Metroplex?

In aviation, a "metroplex" refers to a geographic area comprised of the airports and associated airspace that serve at least one major metropolitan area. The proximity of multiple airports can create complex traffic flows leading to congestion and operational inefficiencies. FAA's Metroplex program takes this integrated view of operations and applies a repeatable, multi-phased process to improve flight efficiency and reduce fuel burn. Each Metroplex project is supported by broad stakeholder participation through its five phases: Study, Design, Evaluation, Implementation, and Post-Implementation.

Performance Based Navigation

How was the Metroplex implemented in Houston?

The Houston Metroplex project was implemented on May 29, 2014 for operations at George Bush Intercontinental Airport (IAH), William P. Hobby Airport (HOU), and 16 satellite airports within the Houston Metroplex region. It introduced changes to airspace design and procedures for airports in the Houston region. These changes included 49 additions, 11 modifications and 20 removals of various types of arrival and departure procedures. The Houston Metroplex project also included development of new Performance Based Navigation (PBN) procedures, as well as

expanded use of Time Based Flow Management (TBFM).

Click here for more information on the Houston Metroplex Project.

How did it impact operations?

Most notably, the Houston Metroplex project affected arrivals to George Bush Intercontinental Airport (IAH) and William P. Hobby Airport (HOU), and showed a reduction in level flight due to the use of arrival procedures designed as Optimized Profile Descents (OPDs). Area Navigation (RNAV) routes and procedures also created repeatable flight paths that improved predictability. The use of OPDs and RNAV routes also reduced radio frequency congestion, as well as the risk of pilot-controller communication errors. The impacts of the Houston Metroplex Project are described further in this Success Story and post implementation analysis.

What is the value of this improvement?

The improvements from the Houston Metroplex project resulted in an annual savings of $5.3 million, based on an FAA analysis. These savings are based on an overall reduction of 1.8 million gallons of fuel, or roughly 3.9 gallons per flight. The FAA estimates that the fuel savings translated to decreased carbon emissions by 15.7 thousand metric tons.

Where else is it implemented?

In addition to the Houston Metroplex, the Metroplex program has also completed projects at the North Texas Metroplex, Northern California Metroplex, and the District of Columbia (D.C.) Metroplex, and has active projects at 8 other locations.

Additional information available on the NextGen Portfolio pages.

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

Read about Performance Based Navigation and RNAV in the 2017 NextGen Update.

Area Navigation (RNAV) Standard Instrument Departures (SIDs)

View a training video for using the RNAV SID phraseology.

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

Read about Performance Based Navigation and RNAV in the 2017 NextGen Update.

Area Navigation (RNAV) Standard Terminal Arrival Routes (STARs)

Read about Performance Based Navigation and RNAV in the 2017 NextGen Update.

Optimized Profile Descents (OPDs)

Learn more about Optimized Profile Descents (OPDs) in the 2017 NextGen Update.

Read how Optimized Profile Descents (OPDs) are helping aircraft operators throughout the National Airspace System.

Situational Awareness and Alerting of Ground Vehicles

Read more about System Wide Information Management (SWIM).

Wake Re-Categorization Phase 1 — Aircraft Re-Categorization

Read how Wake Recategorization is used at other locations in the National Airspace System.

Scorecard

The following metrics summarize performance over a large set of diverse operations at this location. As such, their purpose is to reflect general trends as experienced by aircraft operators and passengers, without regard to their underlying drivers. For this reason, metric values should not be compared to operational impacts attributed to specific NextGen capabilities, where these are provided.

Reportable Hours for IAH
07:00 - 21:59 local time

All Information below is in Fiscal Years (October 1 - September 30).

- Efficiency
- Capacity

Efficiency Performance Indicators

Performance Indicator (FY)	2009	2010	2011	2012	2013	2014	2015	2016
Average Gate Arrival Delay *Minutes per Flight* **During reportable hours, the yearly average of the difference between the Actual Gate-In Time and the Scheduled Gate-In Time for flights to the selected airport from any of the ASPM airports. The delay for each fiscal year (FY) is calculated based on the 0.5th — 99.5th percentile of the distributions for the year. Flights may depart outside reportable hours, but must arrive during them. The reportable hours vary by airport.**	1.7	4.1	2.7	3.9	1.6	6.2	4.9	0.7
Average Number of Level-offs per Flight *Counts per Flight* **The count of level-offs as flights descend from cruise altitudes to the arrival airport, averaged for the fiscal year.**	1	1	2.6	2.6	2.6	2.4	1.9	1.9
Distance in Level Flight from Top of Descent to Runway Threshold *Nautical Miles per Flight* **The distance flown during level-off segments as flights descend from cruise altitudes to the arrival airport, averaged for the fiscal year (FY).**	1	1	31.7	37.5	32.0	27.0	20.9	22.6
Effective Gate-to-Gate Time *Minutes per Flight* **During reportable hours, the difference between the Actual Gate-In Time at the destination (selected) airport and the Scheduled Gate-Out Time at the origin airport. Flights may depart outside reportable hours, but must arrive during them. The reportable hours vary by airport and the results are reported by fiscal year (FY).**	145.3	143.5	144.1	149.7	142.1	146.5	149.0	150.0

Taxi-In Time ***Minutes per Flight*** **During reportable hours, the yearly average of the difference between Wheels-On Time and Gate-In Time for flights arriving at the selected airport from any of the Aviation System Performance Metrics (ASPM) airports. Flights may depart outside reportable hours, but must arrive during them. The reportable hours vary by airport.**	8.6	7.9	7.8	8.1	7.4	7.9	9.1	8.9
Taxi-Out Time ***Minutes per Flight*** **During reportable hours, the yearly average of the difference between Gate-Out Time and Wheels-Off Time for flights from the selected airport to any of the ASPM airports. Flights must depart during reportable hours, but may arrive outside them. The reportable hours vary by airport.**	18.1	17.0	16.6	17.1	15.9	16.7	18.0	17.6

[1] Consistent data for the time period prior to FY 2011 are not available.

As described by the International Civil Aviation Organization (ICAO), *efficiency addresses the operational and economic cost-effectiveness of gate-to-gate flight operations from a single-flight perspective. In all phases of flight, airspace users want to depart and arrive at the times they select and fly the trajectory they determine to be optimum.*

Capacity Performance Indicator

Performance Indicator (FY)	2009	2010	2011	2012	2013	2014	2015	2016
Average Daily Capacity ***Number of Operations*** **During reportable hours, the average daily sum of the Airport Departure Rate (ADR) and Airport Arrival Rate (AAR) reported by fiscal year (FY). The reportable hours vary by airport.**	2,220	2,298	2,279	2,423	2,490	2,426	2,480	2,416
Average Hourly Capacity During Instrument Meteorological Conditions (IMC) ***Number of Operations*** **The average hourly capacity reported during IMC weather conditions (as defined by ASPM). Capacity is defined as the sum of Airport Departure Rate (ADR) and Airport Arrival Rate (AAR). It is calculated based on the reportable**	139	143	144	148	156	152	155	151

hours at the destination airport. The reportable hours vary by airport.								

As described by the International Civil Aviation Organization (ICAO): *The global Air Traffic Management (ATM) system should exploit the inherent capacity to meet airspace user demands at peak times and locations while minimizing restrictions on traffic flow. ICAO also notes: The ATM system must be resilient to service disruption and the resulting temporary loss of capacity.*

Additional Links

NextGen Implementation Plan

View City Pairs Data